



Genetics Unit Department of Histology & Cell Biology

PROGRAM SPECIFICATIONS

Program Title:

Master Degree of

Medical Genetics

Code:

HTMG





Genetics Unit Department of Histology & Cell Biology

PROGRAM SPECIFICATIONS

A- Basic Information

Program Title: Master Degree of Medical Genetics

Program Type: <u>Single</u> √ Double Multiple

Department(s): Department of Histology & Cell Biology

Coordinator: Prof. Fouad Mohamed Badr

External Evaluator(s): Prof. Olfat Gameel Shaker

Last date of program specifications approval: April 2019

Date of specification revision approval: April 2024

Number of credit points (CP) for this degree: 120 CP

B- Professional Information

1- PROGRAM AIM

The program aims are to:

- 1. Provide students with advanced knowledge and skills in the subject of Medical Genetics that will enable them to:
 - a. Describe the detailed structure and organization of the human genome
 - **b.** Describe the basic patterns of heredity and explain how alteration in genes and chromosomes can lead to disease

c. Perform a wide-range of molecular and cytogenetic techniques

- 2. Enable students to use transferable skills in oral presentations, report writing
- 3. Make students familiar with bioinformatics





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- 4. Provide students with adequate knowledge and skills in research methodology that enable them to design experiments, analyze data, and review literature critically
- 5. Provide students with adequate experience in molecular, cytogenetic and biochemical genetics, as well as knowledge of the principles and practice of medical genetics, which will enable them to evaluate individuals and families with genetic disorders, and to choose and interpret the appropriate genetic investigations

2- INTENDED LEARNING OUTCOMES (ILOS) OF THE PROGRAM

A- KNOWLEDGE & UNDERSTANDING:

By the end of this program, participants should be able to:

- A1. Describe basic structure of different cell compartments
- A2. Recognize different types of microscopes
- A3. Describe the chromosomal basis of heredity
- A4. Describe principles of cytogenetics
- A5. Discuss clinical cytogenetics: Disorders of the autosomes and the sex chromosomes
- A6. Describe structure and function of genes
- A7. Describe the organization of the human genome
- A8. Explain how to Identify the Genetic Basis for Human Genetic Disease
- A9. Describe different modes of inheritance, single gene inheritance, Multifactorial (complex inheritance)
- A10. Describe tools of molecular genetics and recombinant DNA technology
- A11. Recognize basic concepts of genetic variations and mutations
- A12. Describe the different types of hematological disorders







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- A13. Describe the normal (Gaussian) distribution and Genetic variations in the population
- A14. Discuss genetic basis of cancer and Hematological malignancies
- A15. Explain genetic basis of chromosomal instability syndromes
- A16. Recognize basic structure and function of proteins, enzymes.
- A17. Describe carbohydrate, protein and lipid metabolism and their disorders.
- A18. Outline different strategies used for treatment of genetic diseases
- A19. Explain basic concepts in general embryology
- A20. Recognize embryological development of Musculoskeletal, Cardiovascular, Respiratory, Gastrointestinal tract, Urogenital systems and head & neck.
- A21. Outline the genetic basis of immunogenetics
- A22. Recognize basic concepts of genetic risk assessment, genetic counselling and prenatal diagnosis
- A23. Recognize the basis of medicolegal and ethical aspects in medical genetics
- A24. Demonstrate basic knowledge of research ethics
- A25. Demonstrate basic knowledge of biostatistics
- A26. Recognize the basis and principles of quality assurance related to Medical genetics

B- INTELLECTUAL SKILLS

By the end of this program, participants should be able to:

B1. Illustrate cell cycle, its control and compare between meiosis and mitosis







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- B2. Explain process of oogenesis and spermatogenesis and Summarize male and female genital system development.
- B3. Explain disorders of gonadal and sexual development
- B4. Explain the genetic basis of hemoglobinopathies and biochemical disorders
- B5. Justify different strategies used in treatment of genetic diseases
- B6. Interpret typical family pedigrees
- B7. Interpret normal karyotype and specify the nature of abnormalities in neoplasms
- B8. Illustrate the methods used for examination and analysis of chromosomes
- B9. Discuss techniques used for chromosome preparation & analysis in hematological disorders
- B10. Justify the role of cytogenetics in the assessment of hematologic disorders
- B11. Exemplify hereditary cancer and compare the clinical presentations of inherited and sporadic cancers
- B12. Discus the chromosomal instability syndromes
- B13. Summarize common genetic disorders, including inborn errors of metabolism, single gene disorders, mitochondrial disorders, multifactorial disorders and congenital anomalies
- B14. Interpret nomenclature used for the description of gene mutations and Summarize different types of mutations
- B15. Report results of cytogenetic, biochemical and molecular laboratory reports
- B16. Interpret biochemical and molecular laboratory reports





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- B17. Comprehend the structure of membranous and non membranous cell organelles in relation to their functions.
 - B18. Correlate different congenital malformations to the corresponding molecular biological defects.
 - B19. Represent the Molecular, Biochemical & Cellular Basis of Genetic Disease

B20. Apply the basic statistical and ethical requirements for the completion of research thesis

- B21. Apply clinical reasoning skills and critical thinking skills.
- B22. Implement the appropriate research methodology
- B23. Plan to improve performance related to Genetics.
- B24. Assess risk in relation to medical genetics practice.

C- PROFESSIONAL & PRACTICAL SKILLS

By the end of this program, participants should be able to:

- c.1 Assess risk & calculate it for different categories of single gene inheritance
- c.2 Examine a karyotype
- c.3 Summarize ISCN (nomenclature) used for the description of chromosomes and their abnormalities
- c.4 Illustrate nomenclature used for the description of gene mutations
- c.5 Write cytogenetic, biochemical and molecular laboratory reports
- c.6 Illustrate different techniques of cytogenetic analysis
- c.7 Solve a wide range of cytogenetic problems
- c.8 Summarize different molecular genetic techniques and design basic molecular genetic experiments





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D- GENERAL & TRANSFERABLE SKILLS

By the end of the program, participants should be able to:

- D1. Collaborate with members/teams from other departments
- D2. Utilize the necessary IT skills that ensure efficient performance
- D3. Communicate effectively with peers and superiors
- D4. Present work in various formats and in an appealing manner
- D5. Perform self-evaluation and evaluation of others
- D6. Adopts the principles of self and lifelong learning.

3- ACADEMIC STANDARDS

A - EXTERNAL REFERENCES FOR STANDARDS (BENCHMARKS)

• The generic Academic Reference Standards (ARS) of NAQAAE for Postgraduate (2009)

B - COMPARAISON OF PROVISION TO EXTERNAL REFERENCES

- This program was adapted taking into consideration the generic academic Reference standards.
- Some unique elements were suggested and introduced during preparation of the program.

4- CURRICULUM STRUCTURE AND CONTENTS

A- PROGRAM DURATION:

The program lasts for a minimum of 2 academic years and maximum 5 years, as specified by the Internal Bylaws for Postgraduate Studies based on the Credit Point System of the Faculty of Medicine, Suez Canal University, approved on February 7th, 2016.

B- PROGRAM STRUCTURE:

Master Program Credit Point (CP) structure:

Total required CPs for acquiring a master degree: 120 CP





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The program consists of the First Part, Thesis, and the Second Part

1. The First Part (30 CP)

Duration: 15 weeks for one academic semester

This part lasts for 6 months and ends in written, practical, and oral exams.

It includes:

- a. A course in <u>Research Methodology (Code: RB)</u> (4 CP) planned by and held at the Community Medicine Department, Faculty of Medicine, Suez Canal University.
- b.A course in <u>Research Ethics (Code: RE)</u> (2 CP) planned by and held at the Forensic and Toxicology Department, Faculty of Medicine, Suez Canal University.
- c. One <u>elective course (Code: E)</u> (2 CP): Students should select <u>one</u> out of six elective courses.
- d. A specialized course in <u>Medical Genetics (Code: HTMG01)</u> (14 CP) planned by and held at the Medical Genetics Unit, Department of Histology & Cell Biology, Faculty of Medicine, Suez Canal University.
- e. One <u>specialized course</u> (8 CP). Students should choose <u>one</u> of the following courses:
 - Cell Biology (Code: HTMG02) held at the Department of Histology & Cell Biology, Faculty of Medicine, Suez Canal University.
 - Biochemistry (Code: HTMG03) held at the Biochemistry Department, Faculty of Medicine, Suez Canal University.
 - iii. Embryology & Teratology (Code: HTMG04) held at the Anatomy Department, Faculty of Medicine, Suez Canal University.
 - iv. Pathology of Neoplasms (Code: HTMG05) held at the Pathology Department, Faculty of Medicine, Suez Canal University.





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2. Master Thesis (30 CP)

The candidate has the right to register the thesis protocol 6 months after registration for the Master degree.

The thesis defense is allowed 6 months after the date of the Faculty Council approval of the thesis protocol and passing the First Part exam.

3. The Second Part (60 CP)

Duration: 45 weeks for 3 consecutive academic semesters.

It consists of a <u>Medical Genetics</u> course (Code: HTMG06), planned by and held at the Medical Genetics Unit, Department of Histology & Cell Biology, Faculty of Medicine, Suez Canal University.

This part lasts for 1.5 years and ends in written, practical, and oral exams.

It includes:

- a. An advanced course in Medical Genetics (10 CP)
- b. An advanced course in <u>Cytogenetics</u> (10 CP)
- c. An advanced course in <u>Molecular Genetics</u> (10 CP)
- d. <u>Practical Training</u> (25 CP)
- e. <u>Scientific Activities</u> (5 CP) (not included in the final marks)

No. of hours per week: 2 CP / week which is equivalent to 50 hours / week, comprising lectures, tutorials, self-learning and hands-on training.

No. of CP: The Master program comprises 120 CP.

One CP is equivalent to 25 working hours (30% (= 7 hours) for face-to-face learning activities, and 70% (=18 hours) for self-learning activities).



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5- PROGRAM COURSES

1. FIRST PART

*CP: Credit Points

****E:** Students should select one of the following courses as an elective course:

E01 Evidence-Based Medicine (Community Department)

E02 Scientific Writing (Medical Education Department)

E03 Quality in Medical Education (Medical Education Department)

Courses			Assessment				
		No. of	Written Exam			Oral	Practical or
Code	Course Title	CP*	No. of Papers	Duration	Marks	Exam	Clinical Exam
RB	Research Methodology & Biostatistics	4	1	2 hours	80		
RE	Research Ethics	2	1	1 hour	40		
HTMG01	Medical Genetics	14	1	3 hours	160	30	90
	Choose one of the following courses	8	1	3 hours	120	40	
HTMG02	Cell Biology						
HTMG03	Biochemistry						
HTMG04	Embryology & Teratology						
HTMG05	Pathology of Neoplasms						
E**	Elective Course	2	1	1 hour	40		
	Total					600 Marks	***
E04 Infection Control (Microbiology Department)							

E05Critical Appraisal(Interostoracy Department)

E06 Communication Skills (Medical Education Department)

***Each credit point is equivalent to 20 marks

2. <u>SECOND PART</u>

	Courses				Asse	essment		
Code	Course Title	No. of CP*	No. of Papers	Written Exam Duration	Marks	Oral Exam	Practical or Clinical Exam	Continuous Assessment (Portfolio)**



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HTMG06	Medical Genetics including: Advanced Course in Medical Genetics	10	3	3 hours For each paper	110 for each paper	110	330	330
	Advanced Course in Cytogenetics	10						
	Advanced Course in Molecular Genetics	10						
	Practical Training	25						
	Scientific Activities***	5						
Total			60 CPs			110) Marks****	

*CP: Credit Point

**Portfolio scores are distributed on different items of the portfolio, and its total score is included in the total mark of the Second Part.

***Scientific activities are not included in the total marks.

****Each credit point is equivalent to 20 marks.

3. <u>THESIS:</u>

One senior and one junior supervisor are nominated from the staff members by the Department Council to prepare a proposal of the thesis protocol after selection of a topic relevant to the research plans of the Department. Data collection, methodologies, study question, time table, ethical considerations and budget are formulated into a research project by the candidate under the guidance of his/her supervisors. The research protocol is then pre-reviewed by two other staff members nominated by the Head of the Department who convey their comments to the supervisors to reach a final form. The thesis protocol is then openly discussed in the Department Council for approval and referral to the Faculty Research Committee, whereby it is critically appraised to confirm it meets the basic research standards set by the Committee. The thesis protocol must then be approved by the Committee of Postgraduate Studies, the Faculty Council and the University Council in successive order, to be registered. The candidate has the right to register the thesis protocol 6 months after registration for Master degree. The thesis defense is





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allowed 6 months after the date of the Faculty Council approval of the thesis protocol and passing the First Part exam.

N.B.: Thesis represents 30 CPs not included in the total mark for master degree.

6-PROGRAM ADMISSION REQUIREMENTS

- The program accepts candidates with a Bachelor degree in Medicine & Surgery with a minimum grade of good.
- Registration for the Master program opens twice a year, according to the Internal Bylaws for Postgraduate Studies of the Faculty of Medicine, Suez Canal University.

7-STUDENT ASSESSMENT METHODS

7.1 Written (MEQs)	to assess the cognitive domain.
7.2 MCQs	to assess the cognitive domain
7.3 Oral Viva Cards	to assess higher cognitive and attitude domains.
7.3 Observations	to assess practical and presentation skills.
7.4 Portfolio	to assess the cognitive, psychomotor and the affective domains.

8-WEIGHTING OF ASSESSMENTS

Type of Exam

First Part (30 CPs = 600 marks)				
Written exam	440			
Oral and practical exam	160			
<u>Total</u>	600			
	Second Part (60 CPs = 1100 marks) (including 5 CPs not included in the total marks)			
Written exam	Second Part (60 CPs = 1100 marks) (including 5 CPs not included in the total marks) 330			

Total marks for Master degree: 1700





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Practical exam	330
Portfolio	330
Total	1100

9-REGULATIONS FOR PROGRESSION AND PROGRAM COMPLETION

The regulations for program completion follow the regulations of the Master degree of Medical Genetics, Faculty of Medicine, Suez Canal University, approved by the Supreme Council of Universities.

First Part

Passing level: 60% of the total marks of the First Part exams

At least 50% of the total marks of written exam are necessary

Second Part

Passing level: 60% of the total marks of the Second Part exams, and at least 60% of the total marks of the practical and oral exams is necessary.

Thesis

Passing the thesis defense is a prerequisite for acquiring a Master degree in Medical Genetics 10-EVALUATION OF PROGRAM INTENDED LEARNING OUTCOMES (ILOS)

Evaluator	Tool	Sample
1- Postgraduate students	Needs assessment questionnaires	Random sample of participants
2- Alumni	Self-administered questionnaires	Comprehensive sample
3- Stakeholders	Self-administered questionnaires	Random sample
4-External Evaluator(s) (External Examiner(s))	External audit of the program specifications	
5- Others		

Head of the Medical Genetics Unit

Head of the Department

Assist. Prof. Eman Abdel-Moemen Mohammed

Prof. Lamiaa Mohammed Farghaly